DEPARTMENT OF ENERGY

POSITION PAPER

FOR

MARSHALL ISLAND STUDY

FROM

BROOKHAVEN NATIONAL LABORATORY

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(REVISIONS INDICATED BY SPACING AND ASTERISK)

INTRODUCTION AND STATEMENT OF PROBLEMS

On October 3, 1978, a meeting was held at the Department of Energy (DOE) Headquarters in Germantown, Maryland, to discuss a number of problems related to the DOE position in relation to several different programs in the Marshall Islands.

The Medical Program, under the auspices of Brookhaven National Laboratory (BNL), generated a great deal of discussion, concerned primarily with the following problems:

1. The research mandate of BNL for the study and care of radiation-related diseases in the exposed populations is clear. However, over a period of twenty-five years, that mandate has been expanded to include care for non-radiation-related diseases. This evolution has been necessitated by the virtual absence of adequate primary care in the Marshall Islands. The BNL medical team has responded in a humanitarian manner to diagnose, treat, and follow-up a number of pathologic conditions which, if untreated, would have led to increased morbidity and mortality in the exposed and comparison groups.

A. Basically, the BNL Medical Program is a medical research program. Its original goal was to "screen" for and detect the earliest changes suggestive of radiation-related pathology, and to treat those lesions as indicated. (The World Health Organization (WHO) states the primary responsibility of any screening effort is the ability to resolve all "abnormal" findings and to assure the patient of referral to an adequate primary care center.)

B. The difficulties are compounded by the fact that valid pre-exposure health care statistics are difficult or impossible to obtain. The Medical Program is in the untenable position of having to deal often with the probability that a specific pathologic condition is or is not related to

radiation exposure, since a cause-effect relationship is impossible to establish definitely for any given case.

C. The people are intellectually and emotionally unable to deal with the concept of "probability" without an intensive, highly-sophisticated educational program designed not only to transfer the information intellectually regarding the role of radiation in their lives, but to concomittantly incorporate that new understanding into their behavior, i.e., the ability to place radiation in its proper perspective for the present and the future. Such a program has already been initiated by Jan Naidu, Ph.D., BNL, with promising results.

* (Please see "Health Education" Addendum II) *

2. The Marshall Islands medical "system" under the Trust Territories is underfinanced. The professional staff is undertrained and overloaded. Critical supplies are usually not available.

A. In the absence of a satisfactory primary care referral base, the BNL Medical Program has expanded its mandate to include such things as a "diabetic study" (which has revealed a high incidence of "maturity onset diabetes") but has set up no mechanism for treatment and follow-up of this disease.

B. In addition, at the request of the people, a large number of Marshallese who were not in the exposed or comparison groups have gone through the screening examination with the detection of a variety of pathologic conditions. An attempt has been made in each case to provide immediate treatment if possible, and to refer the patients to the Trust Territories health care system. Unfortunately, little has been done to treat and to follow-up these patients.

Consequently, the BNL medical team has become the de facto primary health care provider to an ever-expanding group of Marshallese. The rationale of the Marshallese in the BNL program for their claim to the "right for all medical care" is their association of practically all illness with radiation.

3. The BNL medical team, because of its frequent surveys has, in the eyes of the Marshallese, come to represent the U.S. "presence" in the islands. The BNL Medical Program has, therefore, become the target of many attacks directed towards the United States agencies responsible for other programs in the Marshall Islands. These unwarranted attacks have, on several occasions, seriously compromised the goals of the Medical Program. Two major problems of health care delivery for all of the Marshallese involve: (a) communications, and (b) transportation. To the best of our knowledge, these problems have not been addressed independently as health care problems.

DISCUSSION

With the rapid growth of the medical program and the development of this matrix of compounding variables, Dr. Burr and Dr. Wyzen requested a position paper that would outline for DOE the alternatives for the support of a study of radiation-related injuries in the Marshall Islands. These options should include a wide spectrum of alternative programs, keeping in mind the inextricable interrelationship between BNL screening and the health of the people of the Marshall Islands. We feel a failure to deal effectively, in some way, with the primary care requirements of the people will lead to further ill will, failure to comply with the research protocol (e.g., thyroid therapy), and, finally, litigation and a call to foreign and national antinuclear groups to witness the "mistreatment" of the Marshallese by the U.S. government. Since primary medical care is clearly not the mandate of the DOE, perhaps some

interdepartmental agreement could be reached with the Department of Interior and/or the Department of Defense to answer this very pressing problem. U.S. monies are already going to the Trust Territories to provide health care but the utilization of those funds leaves much to be desired.

The analysis of options open to DOE-BNL has been approached in a system analysis format, utilizing an outline as developed by Gordon A. Friesen, of the General Electric Company, Re-Entry Systems Department (Figure 1, page 5).

As in any general systems analysis format, some of the elements will be indeterminant on the basis of available information. In the analysis of "constraints" to the various options, two important facts should be kept in mind. First, there will be a common group of constraints applicable to most options. These constraints will be listed at the end of this section. Pertinent general constraints will be listed by number in Column II (labelled constraints) on the flow sheets for each option. Secondly, constraints should be considered in two categories:

1. Absolute - by definition, an absolute constraint offers no alternatives; in effect, it totally blocks an objective or element of an objective (e.g., no funds);

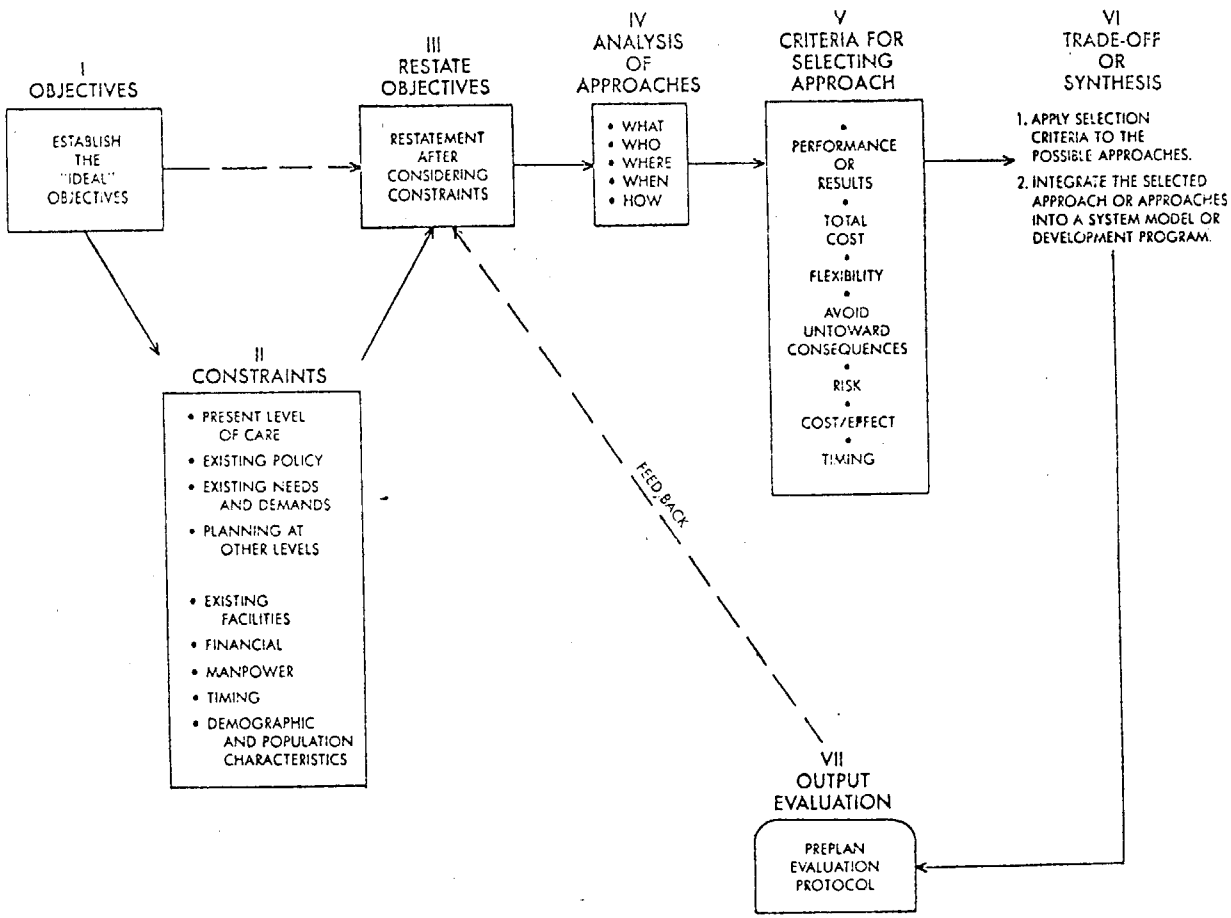
2. Relative - these constraints impose a varying degree of modification on the objective, proportional to the power of the constraint (e.g., 20% of the funds necessary to reach the objective).

Using this format, we will examine

* five *

options relating to the detection and treatment of:

FLOW DIAGRAM FOR AN ANALYSIS OF THE OPTIONS



A. Thyroid and other radiation-related diseases in the exposed and comparison populations.

B. All of A plus other patients already taken into the study with non-radiation related diseases (e.g., diabetes). This would include exposed and comparison group patients only.

C. All of A and B plus all low level radiation exposed patients who have gone through full screening, irrespective of findings of disease (e.g., the Bikini group).

D. All of A, B, and C plus full screening of all inhabitants living on, or scheduled to be repatriated to, the Marshall Islands contaminated by atomic fallout; i.e., background radiation higher than median for all Micronesian islands.

* E. Discontinue the study under DOE mandate and turn the care over to the new Marshall Island Health Care System. *

With these five options in mind, we must first consider the common constraints impinging on the subheadings listed under Column II of the flow sheet (see Figure 1). The unique constraints for each option will be listed as appropriate. The common constraints are:

1. Under current operating policies, DOE responsibilities do not include health care for non-irradiation related pathologic conditions.

2. The definition of "radiation-related" pathologic conditions is not clear. There is uncertainty among radiation experts as to the biologic effects of long-term "low-level" radiation. The status of acute and long-term effects of higher levels of radiation offers a greater consensus by the experts.

In light of the possible change in ICRP maximum permissible dose for the individual, the size of the study group may change in the future.

3. The dosimetry of the islands involved in the March 1, 1954 accident is uncertain. It has been restudied and revised repeatedly as new technology and new data become available. Under the circumstances, only population dosimetry is possible. It would appear from the pathologic results, at least to the thyroids of some of the children of Rongelap, that the individual variations might be considerably higher than was previously estimated (private communication with J. E. Rall, M.D., Director of the Institute of Metabolic and Allied Diseases, National Institutes of Health).

4. Irrespective of the calculated doses to the exposed population, the development of radiation-related disease for which the DOE/BNL/DOI has accepted moral and fiscal responsibility has fixed in the minds of the Marshallese the fact that they and their land have been "poisoned" (synonymous with the Marshallese word for radiation). This intellectual, psychological, and emotional set is deep-rooted and probably cannot be erased.

5. The Marshallese consider themselves a "unique" subpop tion of Micronesia. Their documented "injury" by the U.S., supported by anti-nuclear world opinion, gives them great political and economic leverage. Their recent movement for "free association" will probably not progress to independence, without firm guarantees, in writing, by the United States, that we will continue to compensate the people for injury and damage to their land. Their current concept includes the descendants of those people who have been identified as "injured" through property and/or physical loss.

6. Conversely, the U.S. would like to resolve these claims equitably and to place some reasonable time limit on U.S. liability.

7. The current Trust Territory health care delivery "system" is totally inadequate to serve as the primary care referral base for the BNL team. The reasons for this include:

a) very poor administration (fiscal, personnel, planning, etc.);

b) poor liaison with their source of funds, i.e., Trust Territory;

c) under-trained professionals;

d) heavy patient load (high incidence of a wide spectrum of diseases).

e) very poor facilities and upkeep.

8. The current "power base" in the Marshall Islands lies in the hereditary leaders and their appointed followers. They have assimilated themselves into the modern (free association) government and exert considerable influence over the territory. They have vested interest in protecting their own wealth and positions and the people have little voice in the actual process of "self-determination". These leaders are the people with whom we must deal to resolve our problems, but we must understand their orientation and goals. One of these followers recently advised his constituents to refuse U.S. compensation payments because he interpreted the payments to be a final settlement for all future claims. We feel the leaders realize the possibility of the potential closing or significant reduction in the government investment in Kwajalein, which is their major financial base. Therefore, they will probably demand continued reparations for their land and people.

9. Due to the wide dispersion of the islands (atolls) and people, transportation for the medical team, as well as for the economy, becomes of primary importance. Little is being done to solve this problem.

10. Communications among the widely-scattered islands is non-existent or poor at best. This results in a fractionation of the people, poor flow of information, reliance on rumor, and little or no health care in emergency situations. The solutions to these problems are technologically very simple and relatively inexpensive. Yet somehow they have not been implemented.

11. High volume screening of patients for specific data has become a highly-specialized area. Improvements can be made in screening facilities and methodologies, and these are outlined.

12. The recent repatriation of the people of Bikini, who were noted to be accumulating an increased body burden of ^{137}Cesium, has compromised, in the eyes of the Marshallese, the safety of living on "contaminated" islands. They ignore or reject the concept of "relative risk" based upon carefully-calculated background and ecologic measurements of radiation. The same reasoning will probably apply to the people on Eniwetok and Ujelang.

13. Personnel ceilings, currently in effect at BNL, prohibit any significant expansion of the program, e.g., the addition of the people of Bikini and Eniwetok (please see Option C - IV Analysis-How - p.13).

These constraints are put into context and dissected, in detail, in the following five flow sheets where the significance of their impact on the objectives can be related to the various approaches open to us. The flow sheets are detachable so that they can be placed in vertical sequence for comparison of each facet under each option.

VI. Trade-off or Synthesis

We realize that options A and B would, in fact, represent a reduction in the level of health care delivery currently available. A review of e most recent "189" for FY'79 and FY'80 reveals that in February 1977, DOE agreed "to assist the TT in an expanded health care program for the people living at Rongelap and Utirik. This included complete medical and laboratory examinations of ...all Marshallese living on these atolls." The problems inherent in that agreement were the inability of the TT to follow-up on the diseases discovered in this expanded screening. The BNL field team has limited resources to adequately diagnose and treat primary medical problems. As a result of intensified screening, a large number of "abnormal" findings have been identified. These demand further study and resolution if we are to meet the basic tenets of screening: Do NOT screen unless:

1. You are prepared to follow-up and resolve false positive and false negative findings.

2. The screening process will result in some benefit for the patient.

From a moral and medicolegal standpoint, we should insure adequate follow-up and treatment of all treatable conditions. To identify disease, inform the patient of the disease and then fail to treat it, would run the risk of a serious loss of credibility for the medical team; and more importantly, a disservice to the patient. For example, if a patient is told he is hypertnesive (e.g., diastolic over 105 mmHg), and is not treated, he can assume that:

1. the findings are of little importance because... "the doctors did nothing about it.";

2. "the doctors don't care enough about the patients to try to treat the condition."

Either result is undesirable.

These problems in the "philosophy" of screening are not minor. They should not be ignored in planning this program. A close examination of the actual field conditions reveals that the unavailability of adequate treatment and follow-up is the critical preliminary determinant of exactly what should be done in planning the details of medical and biochemical screening for primary care. Screening for research operates under different constraints, usually protected by a committee to inform and protect the research subject (A Human Studies Review Committee). Failure to comply with either the research or primary care requisites of screening is to invite patient dissatisfaction, litigation, loss of credibility and poor medical practice.

We have emphasized the problems inherent in "expanded" screening because the research goals of the radiation-related diseases are clearly defined in the "189" in Option A and the spectrum of "expanded health care programs" in Options B through D.

The synthesis we are attempting to achieve is the full mandate of Option A, plus as much of Option D as is feasible under present jurisdictional and funding constraints. DOE clearly has responsibility for Options A and B and the Trust Territories (under DOI) the remainder of primary and secondary care under Options C and D. However, with the new movement to "free association" the responsibility will shift to the administration and people of the Marshall Islands.

* Under Option E, the Marshall Islands health care system would assume full responsibility for detection, Rx and follow-up of radiation-related diseases, as well as primary care.*

We would suggest some initial interdepartmental funding to support whichever option DOE/DOI desires until the status of the "free association" is clarified. After a responsible governing body is identified in the Marshalls, a new "sharing" of primary and secondary health costs might be negotiated with the Marshalls, that would direct an adequate percentage of their budget into health care. We feel the medical administrative expertise does not currently exist in the Marshalls to implement and man this new system and would strongly urge the interested parties to obtain the best available health care system analyst to develop realistic cost/effective short and long-term plans for adequate health care with existing and expected resources.

This is the optimum time to perform this type of study and planning and the outcome will greatly influence the scope of the BNL medical effort. Serious consideration should be directed toward the utilization of existing expertise in developing health care systems for the South Pacific. The University of

* Southern California, Loma Linda, and UCLA have *

developed well-recognized and highly-effective programs to deal with many of the basic problems confronted by the Marshall Islands. Those problems are basically a maze of anthropolgic and sociologic characteristics determining the health status of the society and each individual. We feel a multidisciplinary approach to restructuring the health care system will be the most cost/effective method in the long run. The University of Southern California has expressed an interest

in discussing this concept with the BNL team. We feel a coordinated effort by BNL and the University of

* Southern California, Loma Linda *

working with the existing Trust Territory medical program could achieve most of the goals of Option D. Such a program could be developed incrementally, under contract, as specific problems were identified.

Option E - Would be the ultimate answer to the Marshallese demands that they have the final say as to who performs the examinations. They could attempt to do it with existing resources or contract any or all of the elements to outside "impartial" consultants.

ADDENDUM I

TO

POSITION PAPER ON THE

BNL MARSHALL ISLAND PROGRAM

(DATED DECEMBER 1st, 1978)

Dr. Wyzen of the DOE has asked for amplification of the role of the BNL resident physician under each of the options listed in the basic position paper.

Dr. Conard and I feel the role of the resident physician under Option A (the detection and treatment of radiation-related pathology in exposed and control populations) should be outlined as follows:

1. The resident physician's (RP) primary responsibility is to function as the on-site coordinator of the BNL program. He is responsible, in addition, for the supervision of the daily follow-up and treatment of the exposed and control groups in the basic research protocol for radiation-related diseases.

Additional responsibilities under Option B: (A-plus the care and follow-up of patients in the exposed and control groups found to have non-radiation related diseases, e.g., diabetes) would include:

1. As in A - plus the medical follow-up and treatment as indicated for those specific conditions found in ancillary studies as part of the BNL field surveys, e.g., diabetes.

Additional responsibilities under Option C: (A and B - plus medical care for all low-level radiation exposed patients who have already gone through full screening - irrespective of findings of disease, e.g., people living on Bikini - April 1978) would include:

1. As in A and B - plus screening, follow-up and treatment for the 137 people examined on Bikini (April 1978).

Finally, the additional responsibilities under Option D: (A, B and C plus full screening and follow-up) of all inhabitants now living on (or scheduled to be repatriated to) Marshall Islands contaminated by atomic fall-out):

1. As in A, B and C - plus the medical care, i.e., screening, follow-up, treatment and primary preventive medicine of this enlarged study group (maximum about 2000 patients).

The term "medical care" in each of these options has been purposely left undefined. The spectrum of medical care could range from a very narrow interpretation of the research mandate related solely to the detection and treatment of pathologic conditions thought to be related, with a high probability, to radiation exposure, to a widely-expanded concept of "medical care" covering primary prevention, 1°-2° care and comprehensive health care - similar to the defined role of the family practice physician, as defined by the Academy of Family Practice.

OPTION A

The detection and treatment of radiation related pathology in exposed and control populations

*Note: Numbers under constraints refer to common constraints, text p.5-4

I. Establish the ideal objectives

1. Screening:

What pathologic findings are sought?
(A) Thyroid + Hypofunction and/or neoplasia - adenoma or carcinoma
(B) Breast CA (C) Skin CA
(D) Hematologic-leukemia, myelofibrosis, aplastic anemia, (E) GI tract CA (F) Genetic abnormalities (sample size too small to establish a cause + effect relationship to genetic abnormalities) (per Dr. J. Neel).

2. Treatment:

(A) Short-term whatever treatment is indicated to stabilize the patient until he can be safely transported to a designated tertiary care center for definitive therapy.
(B) Long-term therapy directed towards the pathologic condition(s) found at screening or by tertiary care.

3. Follow up:

(A) Short-term periodic re-evaluation of any detected abnormalities to determine their status, e.g., progression vs remission.
(B) Long-term: fixed protocol to follow tertiary/post operative cases for the rest of their lives.

II. Constraints

Present levels of care

Screening: (1)(7)(9)(10)(11)*

Treatment: (4) - BNL currently treats radiation induced problems at BNL and Cleveland with good results.

Follow-up: (2)(4)(8),(9)(10)(11)(12)*

Our resident MD can easily follow up the treated cases but not general primary care.

Existing Policy

(1)(4)(5)(6)(7)(8)(9)(10)* A common point of contact does not exist for all of the agencies effecting or effected by the BNL medical program.

Existing needs and demands

(4)(5)(6)(7)(8)(9)(10)(11)* No unique constraints for Option A.

Projected needs and demands

(2)(3)(4)(5)(6)(7)(8)(9)(10)(11)* - Option A offers the minimum needs and demands but will not meet the Marshallese expectations.

Planning at other levels

(1)(2)(3)(5)(6)(7)(8)* - The lack of coordination/liaison among the many laboratories and governmental agencies involved in the care of the Marshallese has resulted in conflicting information from some concerned U.S. officials. The resulting confusion has placed the U.S. in a vulnerable position - ? credibility.

Existing Facilities

(7)(8)(9)(10)(11)* - The lack of a viable primary referral system is almost an absolute constraint.

Financial

(1)(5)(6)(7)(8)* - option A will require the lowest operating budget, initially. However, the costs of litigation brought by the Marshallese for compensation could result in significant increase in U.S. payments.

Manpower - (1)(3)(4)(5)(7)(11)* - Option A offers lowest requirements. However, a cutback in the level of care provided will provoke lack of cooperation by the Marshallese resulting in poor cooperation, compliance + wasted time, poor data.

Timing - (2)(3)(4)(7)* - Marshallese claim injury due to long-term exposure to "low level" radiation. Recent U.S. "low level" studies and fear of long term effects has strengthened Marshallese position. Bikini episode - media.

Demographic Population Characteristics (4)(7)(8)(9)(10)* - The culture prohibits direct expression of hostility toward another. A mediator must be used. U.S. efforts to clarify grievances unsuccessful to date.

III. Translation

Reinstatement of refined objectives in consideration of restraints.

The relative constraints would not materially change the basic objectives of Option A. An additional objective has been generated by the identification of a lack of coordination among the various agencies and labs involved in the total care of the Marshallese

An additional objective would be to establish a single contact point in DOE to coordinate all these programs and to establish close liaison with DOE & DOI. In addition, since the logistics, e.g., transportation is a common problem to all users, there should be at least one annual users meeting with additional meetings as necessary.

Timing

The timing of the BNL field surveys is of great importance for the following reasons: 1) Long lead time must be included to insure proper notification of the study group - (especially on the outer islands - we must always keep in mind the poor communications); 2) Long lead time and a fixed schedule will do much to counter the charges that BNL has planned its trips to the outer islands to coincide with the absence of many of the leaders; 3) Evenly spaced visits, about 2½ months apart will assist the BNL field staff in the follow-up of the pathologic conditions, i.e., a relatively fixed time base line will remove another variable in data analysis.

IV. Analysis

Develop possible approaches to attaining the objectives, with each approach being stated in terms of:

What: Screening(primary detection), Treatment-short-term, Follow-up,short & long-term, Single contact point for efficient coordination of above.

Who: BNL medical team has 25 years of experience in Option A for screening, treatment and follow-up. DOE best suited to identify single contact point.

Where: Screening of exposed and control populations wherever we can locate them.

When: Timing should be based upon the best available knowledge regarding the time interval for the detection of radiation abnormalities.

How: The BNL medical team is currently doing considerably more than studying radiation related pathology. A well-planned, high intensity educational program would be necessary to explain why the medical program was being reduced at this time. The movement to "free association" will probably compromise the already inadequate health care funding by the Trust Territory.

V. Selection Criteria

Set forth the criteria for the selection of an approach:

Performance or results

A detailed research protocol will be developed to specify the medical criteria and algorithms for the detection of radiation related pathologic conditions (e.g, disease specific items in the history, physical exam and laboratory profile to detect the earliest deviation from "normal function" - TSH (to document thyroid hypofunction.) Each identified pathologic condition (listed under objectives) will be screened by the appropriate methodologies. Treatment and follow-up will be assured by appropriate algorithms and check lists.

Total cost(s)

The total cost will be very close to o[illegible]M expenditures. The reduction in the patient population [illegible] offset by the cost of the educational program to ex[illegible]on the reason for our cut-back in services and by inflation.

Flexibility

This option offers us little flexibility. The pathologic conditions related to radiation exposure in the range determined for the Marshall Islands is rather limited. Our program under this option would be constrained to this limited area.

Avoidance of untoward consequences

With strictly limited goals the probability of obtaining valid data and early detection of disease is enhanced by concentration of funds on limited objectives - i.e., minimum dilution of effort. However, the public outcry against the reduction in the program could have serious political/sociologic consequences.

Risk

The risks to DOE/BNL are: The public reaction to reduced medical care. We are unable to quantify the risks to the program offered by this option but they would probably include: lack of patient cooperation (resulting in ? data), vigorous public protest (locally and internationally) and a vigorous program for DOE/BNL to,at least,return to the previous level of care. Risks to the Marshallese are: 1) Failure to detect other than radiation related diseases - with increased morbidity and mortality among the exposed & control groups. 2) Possible alienation of the Marshallese by DOE/BNL resulting in a breakdown in vital communication.

Cost/effectiveness - No data format now exists to compute cost/effectiveness or cost/benefit. The diffuse funding mechanisms make it very difficult for the principal investigator to obtain an accurate current accounting of monies expended on the medical program. If such data were available and all screening, treatment and follow-up goals clearly defined, some rough estimation of cost/patient could be derived.

OPTION B

The detection and treatment of radiation-related diseases plus the care and follow-up of patients in the Exposed and Control Groups found to have non-radiation related diseases

I. Establish the ideal objectives.

A. Screening for radiation-related pathologic conditions as in Option A - plus additional screening for age and sex correlated high risk diseases.

B Treatment as in Option A for radiation-related diseases. For all other diseases change "tertiary" care center to primary or secondary care center, as available.

C. Follow-up (as in Option A) - Change tertiary care to primary or secondary care, as available.

II Constraints

Present levels of care

Screening: as in Option A - plus, need to develop "risk tables" (age and sex specific) to expand the screening data base. The relative improvement in recent health "statistics" should be of some assistance. Treatment: (1)(7)(9)(10)(11) plus increased logistic requirements of added care. Follow-up: As in Option A - plus increased logistic and manpower required for care.

Existing Policy

As in Option A - plus current operating procedures already includes this added group and others.

Existing needs and demands

As in Option A - The need for better primary care is evident to many Marshallese. They are currently and have historically, demanded better care.

Projected needs and demands

As in Option A - plus an ever increasing base population - crude growth rate 3% - better primary medical care will probably reduce mortality resulting in increasing population. Many Marshallese are asking for birth control education.

Planning at other levels

As in Option A - Plus significant decrease in already meager T.T. support of medical care due to vote for "free association".

Existing Facilities

As in Option A - plus the increased load of further patient care would strain the existing facilities resulting in severely diminishing returns for each health dollar (below minimum "critical Mass").

Financial: (1)(5)(6)(7)(8) The added screening costs will be a small increment in the existing screening program. The added primary and secondary care and follow-up - both short/long term may be a significant amount (dependent upon the diseases selected and their prevlance). (See facilities cost as well).

Manpower: (13) As in Option A - but better cooperation will hopefully improve compliance (and quality of data). The increased screening requirements can be handled by better utilization of manpower, adding one Public Hlth Asst. or nurse practitioner.

Timing: As in Option A - However, increased coverage should raise credibility of DOE/DOI. This option is still below current operating procedures!

Demographic Population Characteristics: As in Option A - but with a reduction in covert hostility + increased cooperation. Population under care, still below, current operating policies.

III. Translation

Restatement of refined objectives in consideration of restraints.

As in Option A - The increased patient care demanded by Option B will require a slight increase in manpower and logistics (funding). Since the increase is directly related to primary patient care and is, therefore, not DOE's responsibility, perhaps some interagency agreement with DOI could be reached to provide this supplement. In addition, if, under the "free association" agreement the DOD-Kwajalein taxes are to paid directly to the Marshall Islands, some fixed portion might be diverted to primary medical care under a DOD/Kwaj-Marshall Island Government agreement.

IV. Analysis

Develop possible approaches to attaining the objectives, with each approach being stated in terms of:

What: As in Option A - plus selected "risk hazard appraisal" screening, care and follow-up.

Who: As in Option A - BNL is currently exceeding Option B in its active commitment.

Where: Screening, care and follow-up of exposed and control groups wherever we can locate them.

When: As in Option A - plus regular intermittent visits (every 2½ months) for follow-up of non-radiation related problems (already being done).

How: We would, actually, need to cut back on our present commitments to comply with Option B, e.g., we have already put almost all of the people formerly on Bikini through the entire screening procedure.

V. Selection Criteria

Set forth the criteria for the selection of an approach:

Performance or results

As in Option A - However, the section on radiation related diseases to be expanded to include those age and sex specific general medical not currently associated with radiation. The methodology of Robbins will be used to determine what specific historical, physical, and labo findings would be most sensitive and specific to detect the most preva diseases (age and sex-determined, e.g., we will not look for coronary atherosclerosis in young females, evidence for alcoholism will be sou young and old males, etc.).

Total Cost

As in Option A -but we can cancel out the specific education progra (explaining the cut in services). The various cost trade-offs have b discussed in the previous sections of this option. We must keep in m that this option is still below our present commitment.

Flexibility

There is increased flexibility with this option. We feel the BNL t stationed at Ebeye could handle this additional load without problems in fact, it would enrich their practice and provide some welcome vari

Avoidance of untoward consequences

The added flexibility and commitment of the DOE/BNL team should enha shaky credibility and generate true gratitude among some of the Marsh The critical point is never to promise more than you can deliver. Th credibility gap may be partially patched by saying "I don't know" mor frequently and by forwarding all pertinent data on to interested Marsh *as soon as it is available.*

Risk

The risks to DOE/BNL are less than with Option A - However, this le effort is below the current program and will cause some adverse react (*publicity, cooperation, etc.*).

The risks to the Marshallese are that a great deal of potentially t disease will be excluded from our attention by this option.

Cost/effectiveness

As in Option A

Timing

As in Option A - The increased population would not appreciably char existing schedule.

OPTION C

All radiation related diseases in the exposed and control groups on Rongelap and Utirik plus all low level radiation exposed patients who have already gone through full screening - irrespective of findings of disease

I. Establish the broad objectives

As in Options A and B but adding all patients, exposed to low level radiation, who have already gone through the BNL screening procedures. This represents the current level of operation. In the future, the screening will be modified as detailed for the "directed data base - risk hazard appraisal" approach of Robbins and Hall.

II. Constraints

Present levels of care
As in Options A and B.

Existing Policy
As in Options A and B.
This option reflects existing de facto field policy.

Existing needs and demands
As in Option A and B. Adding a portion of the Bikini population will probably not fulfill the Marshallese demands or needs.

Projected needs and demands
As in Option A and B. It seems probable that we will be unable to separate, for medical purposes, the Bikini people who returned to Bikini from the remainder on Kili. The Eniwetok people will probably also demand equal treatment.

Planning at other levels
As in Option A and B. Powerful U.S. congressional groups (Yates Committee - on appropriations, etc.) are interested in and investigating the well-being of the Marshallese.

Existing facilities
As in Option A and B. A redesign and construction of a flexible, mobile screening and treatment support facility - would in the long run increase efficiency and reduce cost/patient.

Financial
As in option A and B. The significant variable will be the (?) addition of the people of Bikini and Eniwetok.

Manpower
As in Option A and B. Again the addition of Bikini and Eniwetok would more than double the outpatient load. However, the staff could probably handle the increased load with the addition of a Physician Assistant and a nurse practitioner.

Timing
As in Option A and B. No further constraints (optimum timing).

Demographic Population Characteristics
As in Option A & B. Plus all patients (exposed to low level radiation) previously screened. Adding Bikini (450) + Eniwetok (450).

III. Translations

Restatement of refined objectives in consideration of restraints.

As in Options A and B - Since this is our present level of operation with existing funds - no significant translation of objectives is needed.

IV. Analysis

Develop possible approaches to attaining the objectives, with each approach being stated in terms of:

What: As in Options A and B.

Who: As in Options A and B. - plus all patients, exposed to low level radiation who have already gone through BNL screening procedure - again status of Bikini and Eniwetok will change requirements.

Where: As in Options A and B - plus Kili, Jaluit, ? Eniwetok ? Ujelang.

When: As in Options A and B.

How: If the patient load is doubled and increased, primary care is expected. There will need to be approximately a doubling of the operating budget with a 66% increase in personnel and a ship assigned specifically to the medical program. It would be prudent to separate the identify of the Bikini-Eniwetok group from BNL - We could retain administrative control and function as advisors, but a subcontractor might alleviate some of the anxiety of the new study group that would arise from the "radiation" oriented BNL group. We would suggest the University of Hawaii as the most suitable and interested party. Funding for this increase in primary care might be obtained by pass-through funding from DOI.

V. Selection Criteria

Set forth the criteria for the selection of an approach:

Performance or results
As in Options A and B.

Total cost
As in Options A and B. See [illegible] IV.
- How: for discussion of costs.

Flexibility
As in Options A and B - Increasing flexibility due to larger responsibility for care and better support (logistic and manpower) - permits better scheduling.

Avoidance of untoward consequences
As in Options A and B - plus added credit for more comprehensive care.

Risk
As in Options A and B - With increasing volume of patient care the possibility of sub[illegible]l or poor performance may increase - ? Overc[illegible]ent - this can be offset by adequate planning and logistic support - Expanded operations without these elements should not be attempted.

Cost/effectiveness
As in Options A and B.

Timing
As in Options A and B. This is the optimum time, in light of the political and sociologic situation in the Marshalls to enlarge the program and to make a positive effort to change the image of the study.

OPTION D

All radiation related diseases in the exposed and control populations plus full screening of all inhabitants now living (or scheduled to be repatriated to) Marshall Islands contaminated by atomic fallout

I. Establish the broad objectives	II. Constraints	III. Translation	IV. Analysis	V. Selection Criteria
As in Options A, B and C but with added emphasis on early detection and treatment of all significant diseases. This option offers unequivocable evidence of the true concern of the U.S. for the comprehensive health care of the peoples of the Islands contaminated by the testing program. In addition, such a program would allow us to develop a much more significant "health profile" of the Marshallese to assist in the determination of potential radiation related pathological conditions.	Present levels of care As in Options A, B and C - This option exceeds the mandates of our present program and would be impossible without an appreciable increase in funding. Existing Policy As in Options A, B and C - In addition, in light of the recent (Oct. 12, 1978) DOE/DOI/DOD meeting on the status of the peoples of Eniwetok and Bikini, it appears that this option is the one favored by the Under Secretary of the Interior, Mr. Joseph. Existing needs and demands This option most closely meets the needs and demands of the Marshallese people and their leaders. Projected needs and demands Since this option provides adequate health care for all currently and potentially involved Marshallese, it should meet all projected needs and demands Planning at other levels As in Options A, B and C Existing facilities As in Options A, B and C - A major expansion of existing facilities would be necessary to support a medical program more than twice the present effort. Financial A cost study would need to be instituted as soon as possible to determine the current and future costs of such a program (please see section V Selection Criteria) - under "Total costs". Manpower (IV) As in Options A, B and C. - Please see Section IV Analysis of "How" for manpower requirements. Timing The time is now optimum for DOE in light of recent Marshallese statements of needs. Demographic Population Characteristics As in Options A, B and C - The area to be served will be much more than doubled by this option - i.e., Majuro + Ujelang.	Restatement of refined objectives in consideration of restraints. As in Options A, B and C, the restatement of objectives will be dependent upon: 1. The definitions of the role (moral/fiscal) of the administrators of DOI and DOE to carry through on the statements of principal made at the Oct. 12, 1978 - DOI/DOE/DOD meeting in Washington, D.C. concerning the status of the peoples of Bikini and Eniwetok. 2. If full health care responsibility is assumed - Option D needs no restatement. 3. If limited health care responsibility is the choice - some compromise between Options C and D is indicated.	Develop possible approaches to attaining the objectives, with each approach being stated in terms of: What: Full directed data base, screening and follow-up of pertinent findings in population defined under "Objectives" Who: With the expansion of the patient population, it would be wise to set up (2) field medical teams; (A) the BNL-acute exposure study team (covering peoples of Rongelap - Utirik) and (B) the "low level" study group - under contract - both supported by adequate-10 -20 care at Ebeye and Majuro. Where: As in Option C. When: As in Options A, B and C. How: As in Option C - plus added manpower to support 2 field teams plus at least 2 U.S. trained physicians at Majuro and Ebeye - supported by para-medical personnel, Physician Assistants and nurse practitioners.	Set forth the criteria for the selection of an approach: Performance or results Research based upon a sound primary - secondary care delivery system will provide optimum care for each patient. The total population of the Marshall Islands is about 22,000 people - of these only about 2,000 would be completely covered by Option D. The remaining 20,000 would benefit greatly by the general improvement in the quality of care at the primary centers, - but that would be a secondary goal of the medical staff - working with the existing Marshallese medical officers and their staffs. Total cost Really impossible to develop a reasonably accurate figure. However, based upon our present operating expenses (Option C) with a cumulative budget of about 1 million the expansion to Option D should cost about 1 to 1½ million extra. Flexibility This option gives us the greatest flexibility in scheduling examinations in the field, due to the increased on-site medical and transportation resources. Avoidance of untoward consequences This option offers the best proof of a sincere U.S. commitment to the people. This should help greatly in improving the image of U.S. in all of the media - U.S. as well as international. In addition, with the new "free association", the Marshallese might decide to fill the primary medical care vacuum with Japanese physicians (with the good possibility that left wing - anti-nuclear MD's might become entrenched in the Marshalls). Risk Least risk of all options - unless commitment was made and then not honored. Cost/effectiveness As in Options A,B and C. Timing This is the optimum time for implementing Option D - for two reasons: A) The movement toward "free association" has placed the Marshall Islands in a state of transition. The revisions in the health care delivery systems could move along most smoothly in this period of general and economic transition. B) The people of Bikini and Eniwetok are demanding quick and decisive answers to their very legitimate requests.

OPTION E

All screening, diagnosis and treatment for radiation-related diseases, as well as all other primary care problems shall become the responsibility of the new Marshall Islands Health Care Delivery System.

The population concerned shall be all Marshallese exposed to radiation levels above those ambient for Micronesia.

We would anticipate that such a program would be subcontraced to specialists in this area, since the Marshallese do not possess the required expertise.

The new Marshallese government would, undoubtedly, insist that the U.S. government fund such a program - at a cost greatly exceeding our present annual investment.

In addition, there is a very good possibility that the subcontractors would include some of the strongly anti-nuclear groups from Japan and the U.S. that have been trying to get access to those islands for years.

Their biased reports would probably result in severe world criticism and an escalation in litigation.

MARSHALL ISLANDS STUDY

HEALTH EDUCATION PROGRAM

Hugh S. Pratt, M.D.

INTRODUCTION

At this time, there is no health education effort associated with the Marshall Islands Study. Dr. Jan Naidu (Safety and Environmental Protection, Brookhaven National Laboratory) has begun a well-received program to explain the effects of radiation in man. A companion effort mounted by the Medical Program will be directed towards education for the most common pathologic conditions (diabetes, high blood pressure, malnutrition, and dental problems). This will help the Marshallese understand the relationship of exposure to radioactive material in perspective with their overall health.

To be successful, the program must involve Marshallese, as much as possible, from the beginning. In fact, the program should eventually be run entirely by Marshallese, with BNL personnel serving only in an advisory capacity. Competent indigenous health facilitators can be developed more easily than almost any other allied health profession with a minimum dollar investment.

There is considerable interest now in expanding the Marshall Islands Study. This is an ideal time to begin an entirely new thrust. It has been shown in the past that the people do not understand BNL's role and responsibility without ongoing meetings and explanations. This would assure that need is met in a structured, responsible manner.

HEALTH EDUCATION PROGRAM REQUIREMENTS

This program will have two areas of responsibility which need to be closely related for maximum effectiveness:

1. Personnel development and inservice education.
2. Consumer/patient education.

In order to achieve lasting results, the people receiving the educational programs must be actively involved at all levels, from the beginning. In addition, they should have more direct involvement in the ongoing physical examination and screening portion. To accomplish this, more Marshallese need to be brought into the program. Men and women from each island will be recruited to assist MD's during physical examinations. They will serve as assistants/translators, as well as, in the case of females, chaperones. By training people on each island we are:

1. not so dependent on TT manpower;
2. more likely to head off ill will on each island because people who live there will see, first hand, what we are doing, what constraints we have and the mechanics of the program;
3. we develop people who can become indigenous health facilitators in our absence;
4. we cut costs because we do not have to pay for transportation and salaries on sailing days when no work is done.

The initial training can be done by the MD's and RN's now available to the program, plus two interpreters and the island's health aide, while the other BNL staff are setting up. (Initially, these local assistants would not be expected to perform procedures such as blood pressure measurement or dip stick urinalysis. That would be taught on subsequent surveys.)

It is important that the MD's participate in the training program so they will know what to expect from their assistants and they can begin establishing a working relationship immediately. These training programs always provide a forum for discussion of concerns regarding personal and family health problems. The BNL team can begin to ascertain what each island perceives its biggest health problem to be from this kind of exchange.

With the exception of the TT M.O.'s who accompany the survey, the majority of the BNL collaborators are unfamiliar with Marshallese customs and the TT health care delivery system. By assisting with the training and working with the local health aide and the TT medical interpreters, they will become more deeply involved with the community than they have in the past. The result should be a better understanding of one another's strengths and weaknesses.

As soon as the local people are trained and used on one survey, they should be contacted and used again as soon as possible. Those who drop out should be interviewed to determine why. The interview should be conducted by the BNL Marshallese nurse-practitioner to avoid any cultural bias. It is important that she be involved with all phases of the program, since her presence will lend credibility when plans for "Marshallization" of the program are discussed.

Based on information generated through village meetings and individual discussions with the newly-trained assistants, a pilot program will be developed to be given on the following survey visit. It will be relatively short, and simple hand-out materials will be devised that can be upgraded by the people who receive the first programs, demonstrating that they retain some control. The new assistants (facilitators) will be encouraged to assist in setting up and carrying out the program, if it is culturally appropriate.

Because this is an entirely new concept, both to BNL and the Marshallese, it should be implemented slowly, and should respond only to perceived needs, at first. By allowing the staff health educator freedom to do staff development as well as provide consumer/patient education, she is likely to be viewed as a credible professional by both groups. It also assures she will be assimilated into the working team and will find it easier to recruit educational resources from the professional staff.

Her key liaisons on each island will be the president of the women's club, the queen, the health aide, the minister and the school teacher. It is expected the trip leader will establish liaison with the magistrate and the iroij, if appropriate.

As the idea generates more demand for programs, health educator/RN or PA's (US-trained physician's assistants or medex or Fiji-trained medex) should be recruited fo each island to work with the indigenous health facilitators. If Marshallese or other Micronesians are available, they should be given first consideration. If not, former Peace Corps volunteers who have gone back for medical training would be good job candidates, since they are familiar with the Marshall Islands and speak Marshallese. This program should work directly with the one currently being conducted by Dr. Naidu, which addresses the effects of radiation in man. It will be desirable to "share" educators.

Based on response to meetings held with women's groups on Rongelap and Utirik, on the May-June, 1979 Survey, the women would like programs on nutrition (aimed at weight reduction) on each island. In addition, on Rongelap, the women want to know how to care for acute and chronic otitis media in their children. On Utirik, a dental health program, with supplies, was requested. All of these requests, along with previous requests for education programs on diabetes and

hypertension, provide ample subject matter areas for starting. The important thing will be to make sure the programs are culturally sound and realistic. (The last TT nutrition consultant who lectured to the people of Utirik did so without mentioning a single food they had access to or cared for. This can be avoided by using Marshallese, whenever possible, in developing and delivering the programs.)

Additionally, at first, it will be better to offer a few programs and make each one a significant occurrence. As the idea is understood and accepted, they can and should be offered on a frequent, regular basis, further necessitating a fulltime staff person on each island. It is anticipated that specific programs could be supported by grant funds from various sources, such as drug companies, private foundations and several sources within HEW. Core support should, of course, come from DOE to assure continuity. The educational program should reach close to 100% of the population of each island within the first two to three years.

COMPARATIVE ANALYSIS OF THE TRADITIONAL [illegible]4 - 1978) BNL MEDICAL PROGRAM

AND REQUIRED REVISIONS IN LIGHT OF ACTUAL AND PROJECTED EXPANSION

Aug. 1979

TRADITIONAL CHARACTERISTICS	EXPANDED CHARACTERISTICS
1. Directed toward early detection treatment, and prevention of radiation induced disease.	1. Same
2. Islands involved have included Rongelap, Alingnae, Rongerik and Utirik.	2. Recent developments in 1978 and 1979 have opened the possibility that islands other than t designated in the traditional study may have received variable amounts of radiation, producing a wide spectrum of long term low level radiation of variable intensity. Recently obtained informat from the papers of the USS Renshaw seem to indicate that on March 5-6, 1954 that there was a sign icant increase in background radiation at least on the island of Likiep (? 300mr/hr measured fron the water of the cistern of the Catholic school.
3. Populations under study have included: a. 64 Rongelap - 175 R 4 in utero b. 18 Alingnae - 69 R c. 158 Utirik - 14 R	3. The Secretary of State of the newly formed Marshall Island government, Mr. Anton deBrum states that as a child on Likiep at the time of the Bravo test on 3/1/54, he noted a particulate type of fallout. He remembers the visit of the Renshaw and states that a number of the people o the island underwent personal dosimetry at the time of the visit. He states he can remember the Geiger Muller counter clicking rapidly during the counting of the feet of many of the inhabitant being surveyed. During the ensuing 25 years, Mr. deBrum states he has noted a "very high" incid of thyroid and congenital abnormalities in the people of Likiep.
4. Rongelap received 175 R of gamma radiation; Alingnae received an unknown amount (approx. 69 R). Twenty-eight servicemen received an unknown amount on Rongerik; 158 people on Utirik received 14 R. In addition, all of these islands received an unknown amount of short-lived radio-nuclides - predominantly iodine.	4. In 1970, Dr. R. A. Conard (then director of the BNL Marshall Island Study) visited Likiep and attempted to perform a complete survey of the island aimed at detecting the presence of thyr nodules by palpation of all available inhabitants. During this survey 135 people were examined 5 nodules were detected. Of the three major populated islands in the atoll, one was surveyed. In 1977, a similiar survey was carried out on Wotje. Two of the four inhabited islands in the atoll were visited. The visits to Likiep and Wotje were designed to determine the presence of palpable thyroid nodules in an "unexposed" population. Current data indicate that this popul tion might in fact have had a higher than ambient radiation exposure.
5. The exposed populations were evacuated in a period of 48-72 hours, to Kwajalein, where they were cared for by a team of radiation specialists from the AEC and other nuclear labs. Following an extensive medical and radiologic evaluation of the exposed population, an age-sex matched cohort was established for the people of Rongelap. No cohort was established for Utirik. The people of Utirik were returned to their island 3 months post-exposure; the people of Rongelap, 3 years post-exposure. Follow up	5. The inhabitants of all islands other than Rongelap, Utirik, Alingnae and Rongerik have be reassured repeatedly that they have not been exposed to "significant" radiation. Recently, Mr. deBrum designed and circulated a medical questionaire to determine from a number of the people o Likiep and some surrounding atolls the prevalence of "thyroid" and "congenital" abnormalities si 1954. We have no solid information on the size of the population sampled. However, the survey revealed an unusually high prevalence of "positive" results. The questionnaires have been compl by individuals and in many cases, by health care personnel. Interpretation of these questionnai in their present format is impossible from an epidemiologic standpoint, however the questionnair do raise the possibility of an unexpected incidence of the aforementioned diseases in Likiep. T information has been presented to US - Department of Interior and US - Department of Energy and assurances have been made to the Marshall Islands gov't. that a careful and scientifically valid

studies were performed at 6 months, 1 year and annually for Rongelap. Initially, the Utirik people were seen every 3 years. The surveys have included careful monitoring of the hematopoetic system as well as the thyroid. The only death in the irradiated group due to radiation occurred in a Rongelap child exposed at 1 year who died of acute myelogenous leukemia; there have been about 50 deaths due to natural attrition. In those children exposed at less than age 1 (and the 4 in utero at Rongelap), over 90% have developed evidence of thyroid abnormalities, adenoma, carcinoma or biologic hypothyroidism.

6. New characteristics - in 1957, a "New control" (comparison) population was established due to the mobility of the cohort. This comparison population was closely related to the people of Rongelap and an attempt was made to match for age-sex. As the program has evolved there have been significant changes in the comparison population and as of this date, there is a relatively poor fit between the experimental and comparison populations.

The population of Utirik has developed an unexpectedly high increase of cancer of the thyroid which is unexplained on the basis of their acute initial exposure to radiation. The question has been raised concerning the possibility of the long term effects of low levels of radiation present on both Rongelap and Utirik following the return of the inhabitants.

epidemiologic survey will be performed as soon as possible by an impartial group. If that survey reveals the possibility of an unusual prevalence of possibly radiation induced diseases, a full medical survey, based on the traditional medical surveys will be performed for the islands of Likiep and possibly for Wotje, Mejit and Ailuk as well.

Due to the absence of adequate vital statistics, particularly prior to 1954, but continuing to the present, meaningful analysis of observed/predicted cases of possibly radiation related pathology is almost impossible to obtain. Existing health statistics when reviewed by epidemiologists familiar with the biologic and pathologic patterns prevalent in the South Pacific detect unexpected discrepancies in the Marshallese population. A more direct indication of these differences has been presented by automated biochemical analysis performed on the traditional study population. Analysis of these profiles reveals that from 95-97% of the study group (exposed and comparison) have at least one and on most occasions, multiple biochemical levels that fall outside two standard deviations for comparable US values at certified research laboratories.

To the best of our knowledge, no sufficient data exists to establish adequate, age-sex, specific normative curves for each of these biochemical parameters.

6. Several unique sub-populations have emerged over the last several years. These populations were the original inhabitants of the islands selected as the test site for a long series of nuclear and thermonuclear devices; specifically the atolls of Bikini and Enewetak. In 1977, following extensive restoration and decontamination procedures, the island of Bikini was declared safe for reinhabitation. However, the returning population was cautioned about consuming certain borderline indiginous foods and in visiting other islands with higher background radiation levels. WBC was performed sequentially and in April, 1978 it was determined that the increment of elevation would place many of the individuals above the maximum permissible dose (determined by Cs^{137} measured within the next year). It was therefore recommended that the population that had returned to Bikini Island (134 of approximately 600 Bikinians with land rights) would need to be repatriated to the island of Kili. The fact that this population had absorbed an unexpected amount of radiation, albeit well within the maximum permissible levels has evoked a demand by this population for continued close radiologic and medical monitoring for an indeterminate period of time. We understand that on at least two occasions, statements before US Congressional committees have assured the people of Bikini of these services.

A comparable but somewhat different situation now exists for the people of Enewetak. A multimillion dollar decontamination and rehabilitation program has been undertaken by the U.S. Government over the last several years with the intent of rendering a significant portion of Enewetak Atoll habitable. The people of Enewetak were originally evacuated to Ujelang Atoll. Over the past several years, small groups of people from Enewetak have been returned to the atoll to assist in the rehabilitation. I understand these groups have been rotated periodically (about every 6 months). However, the majority of the work force on Enewetak has been US contract personnel. Careful radiologic monitoring of these workers has indicated no significant radiation risk. Next month (9/79), a major meeting will be held on Enewetak to present to the reps of the Enewetak people, the current radiation situation for those islands of the atoll certified safe for habitation. In addition, they will be provided with other significant radiologic data concerning a number of islands in the atoll that are still considered unsafe for habitation or food gathering. It is the recommendation of their legal counsel that the people of Enewetak on the basis of all on this information make the decision of returning to their home atoll on the basis of "informed consent".

7. The study population now consists of the 244 originally exposed (minus the individuals lost to the study by death or dislocation) plus a group of 209 individuals in the comparison group.

Over the last 10 years, there has been an ever-expanding concern with primary care problems that have been detected in this population who have not been taken care of even after referral to the TT health care delivery system. The program has therefore become more and more enmeshed in primary care, diagnosis and treatment of conditions not thought to be related to radiation, i.e., diabetes and high blood pressure and severe dental disease. Both the field and the departmental directors of the program have realized that adequate screening for radiation related disease will detect this other group of health problems and pathologic conditions and that we are compelled by the lack of TT services to provide primary care. Consequently, with essentially level funding there has been a dilu tion of the research dollar.

8. Staffing - for the last 24 years the full-time staff for this program has consisted of 1 full-time MD/director and 1-2 full time technicians. Over the last 6 years there have been intermittent resident physicians based in the Marshall Islands, however those physicians, with one notable exception, have frequently provided more problems that help to the PI.

Since the condition for return to Enewetak involve the voluntary restrictions of movement by people among the islands of their atoll and prohibition of consuming specific foods from those the possibility of a situation developing analogous to that of Bikini exists. Because of this sibility the US - Department of Energy feels that it is mandatory that careful base line body burdens be obtained on all people returned to Enewetak and that this be done in conjunction wit a careful medical examination. Subsequent WBC and medical examination will be necessary to det any significant accumulation of radioactivity.

7. In addition to the group outlined in the traditional program, the expansion of the progr to include the following islands would increase the study population as follows:

1.	Likiep	400 +
2.	Wotje	400 +
3.	Metjit	300 +
4.	Bikini	6-800
5.	Enewetak	4-500
	TOTAL	2100 +

This population has received a variable amount of background radiation ranging from ambient t indeterminate low. If this population is included in the study group, a careful epidemiologic protocol will need to be provided to characterize the populations, identify the dependent and independent variables and consider the need for/or availability of a comparison population.

8. Staffing - over the last year there have been major changes in the scope and responsibil of the Brookhaven National Laboratory medical program. For the last 2 years there has been an increasing perception of the critical role that communication (health and radiation education) plays in the delicate interface between the Marshallese and the US representatives. Within the lastsix months, concurrent with the establishment of a new Marshall Islands government there ha been a concerted effort by all parties concerned to develop a highly integrated and cooperative effort to serve the medical needs of the Marshallese people. In line with this effort, and considering the projected increase in the study population, a position paper was developed by Brookhaven National Laboratory for US - Department of Energy in December 1978. Since that time recent developments have necessitated a re-evaluation of personnel needs. The program has been without a resident physician in the island for six months and it is anticipated that a function replacement will not be available for another six months. The annual surveys have been re-desi

Recently, a full-time Marshallese nurse-practioner has been added to the staff in the Marshalls and a technician previously based at Brookhaven National Laboratory has been transferred to the Marshall Islands. The remainder of the staff over this 25-year period have been volunteers recruited from leading medical centers and research centers throughout the U.S. They have most frequently been unpaid, highly qualified sub-specialists with a primary interest in the area of thyroid pathology.

Academic liason - the pattern of professional liason established over the preceding 25 years has been primarily on a 1:1 basis - using many of the country's outstanding researchers.

to balance the field survey staff so that the basic adult screening protocol can be obtained in a five week survey, beginning in mid-January, including a staff of 14 professionals (4 MD's and 2 RN's).

Two and a half months later, a five week survey begins in mid-May, directed primarily toward pediatric care but designed also to follow-up on abnormal thyroid findings and to examine patients missed on the January survey. The staff is essentially the same with the substitution of a pediatrician for a thyroid specialist.

The third survey occurs two and one half months later in mid-September and concentrates primarily on delivering dental care and performing ancillary studies..., i.e., diabetes, etc. The staff is as before with the substitution of a dentist for the pediatrician.

The rapidly expanding character of this program has made it necessary to add the following positions:

1. Research Coordinator - since the principal investigator has been traveling 60% of the time since assuming direction of the program, and there has been a marked increase in the complexity of the program involving multiple governmental agencies and academic institutions, it is mandatory that some individual familiar with the intricacies of the program be available and resident at Brookhaven National Laboratory during the absence of the principal investigator. This individual should be supported by:

2. Secretary - since the vast majority of the staff will continue to be voluntary and in many cases, in a compensatory pay status, rapid hard copy communication and coordination is essential to the program.

In addition, the need for a full-time, highly qualified, innovative health educator has been identified. This request has come not only from all segments of the Marshallese people and government but also from the affiliated academic institutions and consultants. Since one of the primary criticisms repeatedly brought against the US Department of Energy program has been the lack of communication the present principal investigator feels that initially top priority should be given to developing a health education program designed:

1) to explain the role of each medical/radiation programs
2) discuss openly and freely radiation risks and to put them in an understandable cultural context and in turn to put those risks in relationship with the indigenous primary health risks.
3) such a program will necessitate the close integration and cross-cultural ties necessary to provide effective communication. The plan will be to develop a core of innovative health educators to train Marshallese from the affected atolls. These Marshallese will in turn, train a cadre of Marshallese. The goal of this program is to establish a fully competent and independent Marshallese training group using a Brookhaven National Laboratory health educator as a resource person.
4) with the incremental increase in the population under study (from 400 to 2000) and characteristics of the current logistic support system, i.e., at present the medical team is limited to 16 shipboard personnel who are able to examine approximatly 500 people in a 5 week period, it becomes obvious that multiple field teams must be developed and logistic support must be refined. The new liasons will therefore involve cooperative efforts with large academic and contractural centers who are able to mount and maintain major field surveys. It is the opinion of a number of experts in this field that the medical programs for the low level radiation groups be university based with a non-nuclear identity. Therefore we have contacted the dean of the medical shool at the University of Southern

California and the dir. .or of the division of community medicine who is a recognized expert in the epidemiology of cancer in the South Pacific. They have expressed an interest in further details of the short and long term goals of the program. In addition, we have discussed the possibility of academic affiliations for training in tropical medicine, family practice, field medicine, preventive medicine and for training of paramedical personnel, i.e., Medex, nurse-practitioners. In addition, since the new Marshall Islands Government is in the process of contracting with a Seventh Day Adventist Health Maintenance Organization, we visited Loma Linda University, the academic base for this group. In discussions with the dean of the medical school and the dean of the school of health, we emphasized our desire to establish a close cooperative effort in delivering primary care for the Marshallese. We inquired if Loma Linda University would be interested in an academic collaboration using faculty and staff on the field trips. They indicated interest in this suggestion and will present the concept to University administration. In addition, we had a preliminary meeting with Dr. Don Paglia (Professor of Pathology at UCLA) who is one of the senior consultants in the Marshall Islands Study and was actually present in the USN evacuation task force in 1954. He has remained in close association with the program throughout its 25 years and indicated he would be willing to discuss and additional cooperative effort between the Department of Energy, Brookhaven National Laboratory and UCLA.

With the potential expansion of the program and the concommitant identification of a significant number of potential thyroid surgical cases, it was felt advisable to begin a preliminary search for West Coast (So. CA) surgical units. Our present arrangements use the services of Brookhaven National Laboratory for medical work ups and evaluation and Case Western Reserve (Cleveland) for surgery. Because of severe climatic conditions this seriously limits the number of months during the year during which we are able to treat the Marshallese. A warm west coast facility would give us a great deal more flexibility.

UPDATED BROOKHAVEN NATIONAL LABORATORY

MARSHALL ISLAND MEDICAL SURVEY

POSITION PAPER

NOVEMBER 1979

In December, 1978, I developed a position paper discussing some of the most pressing problems facing the DOE/BNL Medical Survey. In that paper I attempted to present a spectrum of solutions, ranging from purely a research commitment to total medical care for the Marshallese affected by atomic weapons testing in their islands. Since that time, a number of new problems have arisen and should be addressed in the context of the original systems analysis format. These new problems will not basically change the options presented in the flow sheets but will modify some of the constraints, and require a reassessment and/or restatement of the priority of some of the objectives.

Historically, this program has had rather a narrow focus, looking for radiation-related pathology, particularly in the thyroid, e.g., thyroid adenomas, carcinomas, and biologic hypothyroidism, and in the hematopoietic system, e.g., blood dyscrasias in the study group. Over the last year a number of new problems have emerged that will probably require a sizeable increase in the scope of the program. They are: 1) New data (previously secret) has revealed that Likiep Atoll received detectable fallout after the 1 March 1954 detonation. Mr. Anton DeBrum, Secretary of State of the new Marshall Islands government, designed and circulated a medical questionnaire to the residents of Likiep. The results of that questionnaire were delivered to the U.S. Government and the U.N. with a demand that "something" be done to evaluate the situation on Likiep. We are currently working with an independent epidemiologic consulting group to verify Mr. DeBrum's findings. If, in fact, Likiep shows a significant increase in birth defects or selected cancers, then the DOE feels a full medical survey of the islands in the Likiep Atoll should be undertaken.

An ancillary problem that must be considered is the geographical location of Likiep. If Likiep shows an increased incidence of possibly radiation-related pathology, then a number of atolls lying between Likiep and the

Rongelap-Utirik axis will need to be studied. This would include Ailuk Atoll and Mejit Island. In addition, Wotje should probably also be screened in an attempt to find a base line perimeter with ambient Micronesian radiation background. I understand data exists relating to radiologic surveys made throughout the weapons-testing period for many of the Marshall Islands.

A second, independent but related problem has arisen from recent studies in low-level radiation. The program, up until January 1, 1979, was oriented primarily toward the study of acute radiation effects caused by exposure to external and internal radionuclides in the study population. The comparison population, defined in 1957, consisted of Rongelapese who were not acutely exposed but returned to Rongelap in 1957 with the exposed group. Since Utirik had only received about 14 rads of external gamma, the people were returned to the island four months after contamination and no Utirik control population was selected. Over the ensuing years, the development of thyroid pathology has been impressive.

On Rongelap, four cases of cancer of the thyroid have been detected in the exposed group. Quite unexpectedly, three cancers have been confirmed at Utirik in the exposed group, and there are two additional cancers in people who have spent much of their time on Utirik since 1 March 1954. In addition, one of the Rongelap controls (, who developed cancer, has been living on Rongelap since 1958.

We know that both Rongelap and Utirik were reinhabited at a time when the background radiation was slightly above ambient for the "unexposed" areas in Micronesia. The problem we now face is that many of the "comparison" group were exposed to this environment and, therefore, constitute a subpopulation of "low level-exposure".

In light of some (John Nicoloff - President, American Thyroid Association) current opinion that a thyroid tissue dose as low as six rads may be carcinogenic,

the delineation of the cumulative dose to the exposed and comparison groups becomes important. We know that the only remaining nuclide of iodine on both islands was I^{129} with a half-life of 1.6×10^{7} years (i.e., biologically inactive). The active nuclides have been primarily Ce^{137} and Sr^{90}. Their impact on the thyroid deserves further study.

A third problem concerns the administration of the program. During the last year, the logistic support for the medical program has been marginal to unsatisfactory. (Please see enclosures 1 through 16 for details.)

The problems may be divided into:

(1) Logistic (see enclosures).

(2) Administrative, i.e., responsibility vs authority for making substantive changes in the medical program. (See enclosures 17-19).

(3) Fiscal - the budget is now divided between BNL and the PASO fiscal officers. Very little exchange of information is provided. We would strongly recommend that central funding control and authority be centralized at BNL. (See enclosure 20).

(4) Interagency (DOI) commitments of DOE resources and policy. (Please see enclosure 21).

These problems, developing over the last year, have greatly hampered the growth of the program. In light of the rapidly-evolving political situation in the Marshall Islands and its impact on the U.S. Congress, the enclosed documents are presented for consideration of future plans.